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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,900	04/11/2005	Warren Thomas Johnson	2002P87057WOUS	9243

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SIEMENS CORPORATION
INTELLECTUAL PROPERTY DEPARTMENT
170 WOOD AVENUE SOUTH
ISELIN, NJ 08830

EXAMINER	
ANDERSON, DENISE R	
ART UNIT	**PAPER NUMBER**
1797	

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02/19/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/530,900	JOHNSON, WARREN THOMAS	
	Examiner	Art Unit	
	Denise R. Anderson	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-13 and 15-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-13 and 15-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 December 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Objections

2. Claim 13 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Independent claim 10 recites:

> *each of the at least one open-ended tubes having at least one of the at least one membrane modules mounted therein*

Claim 13 recites:

> *Claim 13. (previously presented): The filtration arrangement according to claim 10, wherein each of the at least one membrane modules is mounted in a corresponding open-ended tube.*

As such, claim 13 fails to further limit the subject matter of claim 10, the previous claim.

3. Claim 31 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 31 is shown below.

> *Claim 31. (previously presented): The water treatment system of claim 29, wherein the aeration hood is partially filled with air.*

The previous independent claim 27 and dependent claim 29 has already recited an aeration hood in the water treatment system. As such, claim 31 adds no further structure to the water treatment system being claimed because material (applicant's recited air) or an article worked upon does not limit apparatus claims. Specifically, the MPEP 2115 [R-2] cites the following case law. "'Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim.' *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, '[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.' *In re Young*, 75 F.2d 996, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963))."

Claim Rejections - 35 USC § 103
Filtration Arrangement Recited in Claims 10-13, 15-21 and 35

4. Claims 10-13, 15-19, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horii (JP10076264A, Mar. 24, 1998 – esp@cenet Abstract, Patent Publication, Machine Translation), in view of Cote et al. (US 5,607,593, Mar. 4, 1997) for the tube design details, in further view of Ide (JP2277528, Nov. 14, 1990 – esp@cenet Abstract, Patent Publication, Translation) for the enclosed feed tank.

5. Table 1 below keys the claimed structure to that of the prior art. The claims follow in italics, with the keyed structure of Table 1 underlined. After each claim or set of claims is the patentability analysis in normal font.

Table 1: Claimed structure keyed to that of the prior art.

Claimed Structure	*Prior Art -- Horii*
Filtration arrangement – Fig. 1, arrangement.	***Filtration arrangement*** – Fig. 1, sewage treatment device using the immersed membrane separation device.

Feed tank – Fig. 1, feed tank 6.	Horii, ¶ 1, lines 1-2. ***Feed tank*** – Fig. 1, immersion tank 1.
Aeration hood – Fig. 1, aeration hood 10.	***Aeration hood*** – Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall.
Membrane module – Fig. 1, membrane module 5.	***Membrane module*** – Figs. 1 and 2, membrane elements 15 within partitioning walls 3.
Tube – Fig. 1, tubes 14.	***Tube*** – Figs. 1 and 2, with partitioning walls 3. Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various configurations such as cylindrical (applicant's tube), fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As recited, then, Horii discloses applicant's Fig. 1 of upward flow through cylindrical channels (applicant's tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood in a feed tank) and meets the limitation of "at least one tube, distinct from any sidewall of the aeration hood, extending downwardly from the upper wall of the aeration hood."
Aeration inlet – Fig. 1, aeration openings 17.	***Aeration inlet*** – Figs. 1-3, water-passage parts 18.

Claim 10. (previously presented): A filtration arrangement comprising:

an aeration hood comprising an upper wall and at least one downwardly extending side wall, the at least one side wall at least partially shrouding at least one membrane module vertically positioned within a feed tank, the aeration hood comprising at least one open-ended tube distinct from any side wall of the aeration hood, the at least one open-ended tube extending downwardly from the upper wall (of the aeration hood)*, the aeration hood configured and arranged such that a gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood,*

each of the at least one open-ended tubes having at least one of the at least one membrane modules mounted therein, at least one of the at least one membrane

modules in fluid communication with an interior of the feed tank through a lower end of the at least one open- ended tube,

at least one aeration inlet in a wall of the at least one open-ended tube, and

the at least one downwardly extending side wall (of the aeration hood) *extending to below the location of the at least one aeration inlet in the wall of the at least one open-ended tube.*

6. Regarding independent claim 10 – In Figs. 1 and 2 shown below, Horii discloses a "Sewage Treatment Apparatus Using [an] Immersion Type Membrane Separator." Horii, Title. Horii discloses the claimed invention except for explicitly describing the membrane module structure. Cote et al. discloses the membrane module structure in Figs. 9, 9A, and 9C shown below – in the context of an "Installation for Making Water Potable with Submerged Filtering Membranes." Cote et al., Title.

Horii, Figs. 1-3:
Filtration arrangement with aeration hood to promote a circulatory flow.

Fig. 1

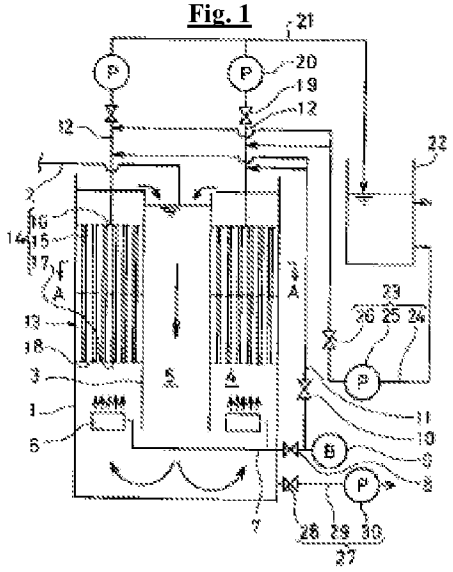


Fig. 2

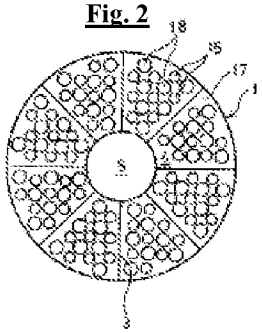
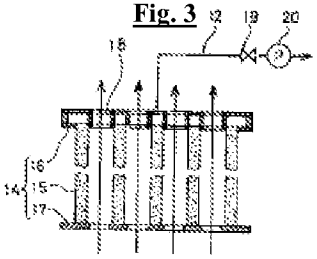


Fig. 3



Cote et al., Figs. 9, 9A, and 9C:
Membrane modules in tube to promote circulatory flow.

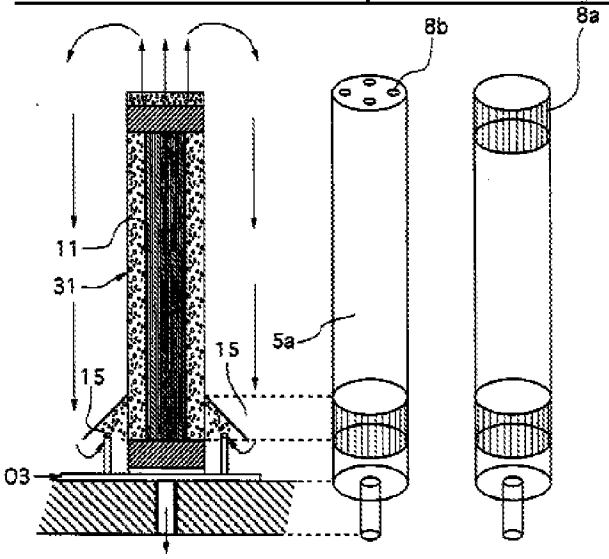


Fig. 9 Fig. 9A Fig. 9C

7. In the above figures, Horii discloses a filtration arrangement (Fig. 1) with an aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) that has an upper wall (header 16 bottom) and a downwardly extending side wall (Figs. 1 and 2, partitioning walls 3 and portions of immersion tank 1's side wall), shrouding membrane modules (Figs. 1 and 2, membrane elements 15 within portioning walls 3) that are vertically positioned within a feed tank (Figs. 1 and 2, immersion tank 1). Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various configurations such as cylindrical, fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As recited, then, Horii discloses applicant's Fig. 1 of upward flow through cylindrical channels (applicant's tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood within a feed tank) and meets the limitation of "at least one tube, distinct from any sidewall of the aeration hood, extending downwardly from the upper wall of the aeration hood."

8. In the above figures, Horii discloses that each tube (Figs. 1 and 2, with partitioning walls 3) has within it at least one membrane module (Fig. 1, membrane element 15 within partitioning walls 3). The membrane modules (Fig. 1, membrane element 15 within partitioning walls 3) are in fluid communication with the interior of the feed tank (Fig. 1, immersion tank 1, at its center) through the lower end of the tube (Figs. 1 and 2, with partitioning walls 3).

9. In the above figures, Horii discloses that there is at least one aeration inlet (Figs. 1-3, water-passage part 18). Horii further discloses that at least one side wall of the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's

side wall) extends below the location of the one aeration inlet (Figs. 1-3, water-passage part 18) that is within the tube (Figs. 1 and 2, with partitioning walls 3).

10. Dependent claims 11, 13, 16, and 17 are shown below in italics, with the claimed structure underlined that is keyed to the prior art in Table 1.

Claim 11. (previously presented): The filtration arrangement according to claim 10, wherein at least one of the aeration hood side walls is formed by a side wall of the feed tank with the upper wall being sealingly attached to the at least one aeration hood side wall.

Claim 13. (previously presented): The filtration arrangement according to claim 10, wherein each of the at least one membrane modules is mounted in a corresponding open-ended tube.

Claim 16. (previously presented): The filtration arrangement according to claim 10, further comprising an aeration header located below the aeration hood.

17. (previously presented): The filtration arrangement according to claim 10, wherein the at least one side wall (of the aeration hood) *extends downward to at least a downward extent of a lower end of the at least one open-ended tube.*

11. Dependent claim 13 was objected to above as failing to further limit claim 10. As such, claim 13 will be rejected on the merits as is claim 10.

12. Regarding dependent claims 11, 16, and 17, Horii discloses that a the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) is formed by a side wall of the feed tank (Figs. 1 and 2 immersion tank 1) with the aeration

hood's upper wall being sealingly attached to the feed tank [claim 11]. An aeration header (Fig. 1, diffuser 6), is located beneath the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) [claim 16]. At least one sidewall of the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) extends downward to at least the lower end of the tube (Figs. 1 and 2, with partitioning walls 3) [claim 17].

13. Dependent claims 12, 15, 18, 19, and 35 are shown below in italics, with the claimed structure underlined that is keyed to the prior art in Table 1.

Claim 12. (previously presented): The filtration arrangement according to claim 10, wherein the at least one aeration inlet is disposed adjacent to a lower end of the at least one open-ended tube.

Claim 15. (previously presented): The filtration arrangement according to claim 10, wherein the at least one aeration inlet is shaped as a slot.

Claim 18. (previously presented): The filtration arrangement according to claim 15, wherein the at least one aeration inlet is spaced adjacent to a lower end of the at least one open-ended tube.

Claim 19. (previously presented): The filtration arrangement according to claim 10, wherein the at least one aeration inlet is shaped as an open-ended slot extending upwardly from a lower end of the at least one open-ended tube.

Claim 35. (previously presented): The filtration arrangement of claim 10, wherein the at least one aeration inlet in the wall of the at least one open-ended tube is at a location spaced from the upper end of the at least one open-ended tube.

14. Horii discloses the claimed invention except for the recited tube design details. The Horii Fig. 1 embodiment does not explicitly teach aeration inlets in the wall of the tube [claim 10] at the top [claim 35] and the bottom [claim 12]. The recited aeration inlets are in the form of slots [claim 15], specifically, open-ended slots [claim 19], at the tube's lower end [claim 18]. Cote et al. discloses all but one of these limitations in Figs. 9, 9A, and 9C shown above – in the context of an "Installation for Making Water Potable with Submerged Filtering Membranes." Cote et al., Title. The one limitation is in claim 18 where it is recited that open-ended slots are at the bottom of the tube, instead of at the top, which Cote et al. discloses in Fig. 9C. It would have been obvious to one of ordinary skill in the art that time the invention was made to have the Horii open-ended slots at the bottom of the tube instead of the top since this is an example of combining prior art elements (open-ended slots with a tube) according to known methods (the open-ended slots provide liquid entrance to or exit from the tube) to yield predictable results (the solids in the liquid are filtered).

15. Cote et al. further teaches that the disclosed arrangement is used to promote circulatory flow within the tank. Specifically, Cote et al. teaches, "The ozone could thus be produced out of air (applicant's recited aeration generated by an aeration header) or oxygen. . . . [T]he ozone is thus used to serve both as a circulation fluid and an oxidizing fluid." Cote et al., col. 3, lines 10 and 27-28.

16. From the above Figs. 9, 9A, and 9C, Cote et al. discloses a membrane module mounted inside a tube (sheath 5a) having aeration inlets (open-worked zones 8a or holes 8b) in the wall of the tube (sheath 5a) [claim 10] at the top [claim 35] and the bottom [claim 12]. The aeration inlets are in the form of slots [claim 15], specifically open-ended slots (open-worked zone 8a shown at top) [claim 19] at the tube's upper end and lower end [claim 18]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the Horii filtration apparatus with the tubes taught by Cote et al., since Cote et al. shows in Fig. 9 and states at col. 3, lines 10 and 27-28, such a modification would promote circulatory flow within the tank.

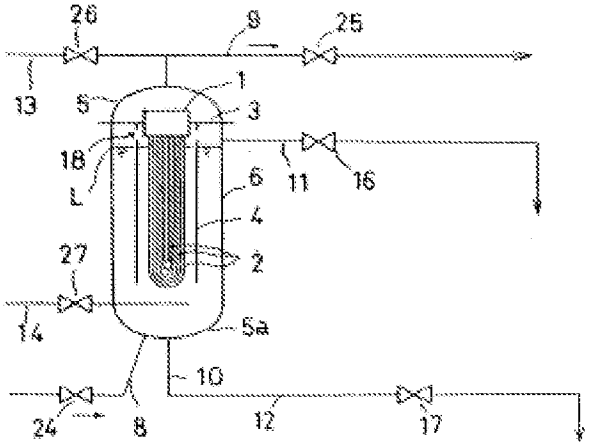
17. Horii, in view of Cote et al., discloses or suggests the claimed invention except for explicitly teaching the aeration hood is enclosed, i.e. explicitly teaching

> *the aeration hood configured and arranged such that a gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood.*

Ide teaches the enclosed hood meeting the recited functional limitation in the context of a "Reverse Washing Apparatus of Hollow Yarn Membrane-Filter." Ide, Title.

18. Specifically, In Fig. 5 shown below, Ide discloses limitation is inherent when carried out in an enclosed aeration hood (tube plate 3, trunk 6 and protecting tube 4) with membranes (membranes 2) located in a tube (protecting tube 4) and the tube wall is open-ended at the bottom and has aeration inlets (vent holes 18) at the top, above the membranes (membranes 2).

Ide: Fig. 5



Ide refers to Fig. 5 and teaches, "[A] means for separating adhered fine particles by reverse washing with pressurized air and also removing the adhered fine particles by generating air at the side or bottom (applicant's configuration) of the hollow yarn membrane for vibrating the hollow yarn membranes is disclosed in the laid-open patent Sho 60[1985]-19002. . . . When reverse washing is carried out by these means, a phenomenon of ***gradually lowering the liquid level in the trunk during reverse washing occurs***. ***By this, the upper part of the hollow yarn membrane is exposed to air*** so that the effect of vibrating the hollow yarn membranes by air is reduced by a half and a phenomenon of keeping separated fine particles in the protecting tube and adhering again the particles to the hollow yarn membrane also occurs." Ide, Translation, p. 4, lines 1-4 and 8-13, emphasis added. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have configured and arranged the Horii filtration apparatus with an enclosed aeration hood, i.e. such that a gas fed into the aeration hood would gradually displace feed liquid and lower a level of feed liquid in the aeration hood, as taught by Ide in the Translation, p. 4, lines 8-13, since Ide also states in the Translation, p. 4, lines 1-4 that such filtration apparatus would allow "removing the adhered fine particles by generating air at

the side or bottom (applicant's aeration configuration) of the hollow yarn membrane," i.e., would allow membrane cleaning via aeration.

19. In summary, Horii, in view of Cote et al. for the tube design details, in further view of Ide for the enclosed feed tank, discloses or suggests all limitations recited in claims 10-13, 15-19, and 35.

Claim Rejections - 35 USC § 103
Filtration Arrangement Recited in Claims 20 and 21

20. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horii (JP10076264A, Mar. 24, 1998 – esp@cenet Abstract, Patent Publication, Machine Translation), in view of Cote et al. (US 5,607,593, Mar. 4, 1997) for the sleeve (or tube) design details, in further view of Ide (JP2277528, Nov. 14, 1990 – esp@cenet Abstract, Patent Publication, Translation) for the enclosed feed tank.

21. Table 2 below keys the claimed structure to that of the prior art. The claims follow in italics, with the keyed structure of Table 2 underlined. The patentability analysis is next, in normal font.

Table 2: Claimed structure keyed to that of the prior art.

Claimed Structure	*Prior Art -- Horii*
Filtration arrangement – Fig. 1, arrangement. ***Feed tank*** – Fig. 1, feed tank 6.	***Filtration arrangement*** – Fig. 1, sewage treatment device using the immersed membrane separation device. Horii, ¶ 1, lines 1-2. ***Feed tank*** – Fig. 1, immersion tank 1.
Aeration hood – Fig. 1, aeration hood 10.	***Aeration hood*** – Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall.
Membrane module – Fig. 1, membrane module 5.	***Membrane module*** – Figs. 1 and 2, membrane elements 15 within partitioning walls 3.
Sleeve – Fig. 1, tubes 14.	***Tube*** – Figs. 1 and 2, with partitioning walls 3. Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various

Aeration opening – Fig. 1, aeration openings 17.	configurations such as cylindrical (applicant's tube), fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As recited, then, Horii discloses applicant's Fig. 1 of upward flow through cylindrical channels (applicant's sleeves or tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood within a feed tank) and meets the limitation of "an aeration hood positioned within the feed tank, distinct from the sleeve." ***Aeration opening*** – Figs. 1 and 3, water-passage part 18 through header 16.
Open region – Fig. 1, region between membrane modules 5 and aeration lines 18.	***Open region*** – Fig. 1, region between membrane elements 15 and air diffuser 6.

22. Claims 20 and 21 are shown below in italics, with the claimed structure underlined that is keyed to the prior art in Table 1.

Claim 20. (previously presented): A filtration arrangement comprising:

at least one membrane module positioned vertically within a feed tank;

a sleeve surrounding a periphery of the at least one membrane module, the sleeve extending partially along a length of the at least one membrane module, and having an open region adjacent to a lower end of the at least one membrane module;

an aeration hood positioned within the feed tank, distinct from the sleeve, positioned to shroud the at least one membrane module at the location of the open region, the aeration hood configured and arranged such that a gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood;

at least one aeration opening in a wall of the aeration hood positioned adjacent to the open region, the aeration hood constructed and arranged to direct a gas through

the at least one aeration opening and into an interior of the sleeve through the open region upon displacement of the feed liquid in the aeration hood; and

at least one aeration outlet in the sleeve above an upper wall of the aeration hood.

Claim 21. (previously presented): The filtration arrangement of claim 20, wherein the open region is defined by at least one opening in the sleeve.

23. The claims recite many limitations already discussed above, substituting the term "sleeve" for "tube" and substituting the term "aeration opening" for "aeration inlet." The claims further recite an open region adjacent the lower end of the membrane module [claim 20], shrouded by the aeration hood [claim 20], and defined by an opening in the sleeve or tube [claim 21]. As shown above in Horii's Figs. 1-3, Horii discloses an open region (region between membrane elements 15 and air diffuser 6) adjacent the lower end of the membrane module (membrane elements 15 within partitioning walls 3) and shrouded by the aeration hood (header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall). The Horii open region (region between air diffuser 6 and membrane elements 15) is further defined by the cross-sectional opening in the sleeve or tube (Figs. 1 and 2, with partitioning walls 3) just above the air diffuser 6. As such, Horii discloses the recited aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) arranged to direct gas through the aeration opening (cross-sectional opening just above air diffuser 6) and into an interior of the sleeve or tube (with partitioning walls 3) through the open region (region between air diffuser 6 and membrane elements 15) when air diffuser 6 aerates, i.e. "upon displacement of the feed liquid in the aeration hood" with air, as recited.

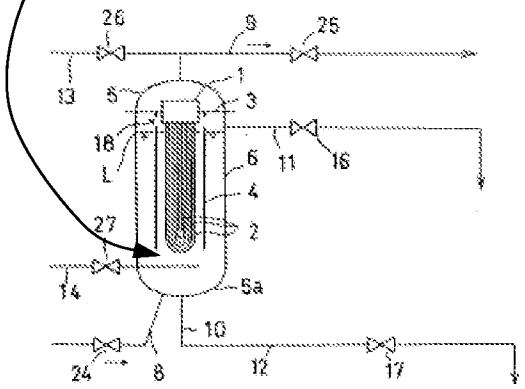
24. Horii further teaches the recited aeration outlet (Fig. 3, water-passage part 18 through header 16) [claim 20] that is above the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) [claim 21]. Horii does not explicitly teach the aeration outlet is in the sleeve or tube as recited. Cote teaches such an aeration outlet (Fig. 9C, open-worked zones 8a). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the Horii aeration outlet as taught by Cote et al., since Cote et al. shows in Fig. 9 and states at col. 3, lines 10 and 27-28, such a modification would promote circulatory flow within the feed tank.

25. Regarding the limitation:

> *the sleeve extending partially along a length of the at least one membrane module, and having an open region adjacent to a lower end of the at least one membrane module;*

In the figures above, Horii discloses the sleeve (Figs. 1 and 2, with partitioning walls 3) extending along the length of the membrane module (Figs. 1 and 2, membrane elements 15 with air diffuser 6 between partitioning walls 3) instead of extending the sleeve partially along the length of the membrane module, such that the open region is without a sleeve, as recited. In Fig. 5 shown below, Ide teaches that it is known in the art to extend a sleeve (protecting tube 4) partially along the length of the membrane module (membrane module 1 with bubbling air inlet 14) such that the open region (region between the membranes 2 and bubbling air inlet) is without a sleeve.

Ide, Fig. 5:
Membrane modules with open region w/o sleeve between membranes and aeration header.



26. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have extended the sleeve partially along the length of the membrane such that the open region is without a sleeve, as taught by Ide, since this is an example of simple substitution of one known element (extend the sleeve along the length of the membrane module) for another (extend the sleeve partially along the length of the membrane module, such that the open region is without a sleeve) to obtain predictable results (the air enters the membrane module from its lower end, while the sleeve protects the membranes along most of their length).

27. To summarize, Horii, in view of Cote et al. for the sleeve (or tube) design details, in further view of Ide for the enclosed feed tank, discloses or suggests all limitations recited in claims 20 and 21.

Claim Rejections - 35 USC § 103
Water Treatment System Recited in Claims 27-34

28. Claims 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horii (JP10076264A, Mar. 24, 1998 – esp@cenet Abstract, Patent Publication, Machine Translation), in view of Cote et al. (US 5,607,593, Mar. 4, 1997) and Ide (JP2277528, Nov. 14, 1990 – esp@cenet Abstract, Patent Publication, Translation) for the tube design details.

29. Table 3 below keys the claimed structure to that of the prior art. The claims follow in italics, with the keyed structure of Table 3 underlined. After each claim or set of claims is the patentability analysis in normal font.

Table 3: Claimed structure keyed to that of the prior art.

Claimed Structure	*Prior Art -- Horii*
Water treatment system – Fig. 1, arrangement.	***Water treatment system*** – Fig. 1, sewage treatment device using the immersed membrane separation device. Horii, ¶ 1, lines 1-2.
Feed tank – Fig. 1, feed tank 6.	***Feed tank*** – Fig. 1, immersion tank 1.
Aeration hood – Fig. 1, aeration hood 10.	***Aeration hood*** – Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall.
Membrane module – Fig. 1, membrane module 5.	***Membrane module*** – Figs. 1 and 2, membrane elements 15 within partitioning walls 3.
Tube – Fig. 1, tubes 14.	***Tube*** – Figs. 1 and 2, with partitioning walls 3. Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various configurations such as cylindrical (applicant's tube), fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As disclosed, then, Horii teaches applicant's Fig. 1 of upward flow through cylindrical channels (applicant's sleeves or tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood within a feed tank) and meets the limitation of "a tube distinct from any side wall of the aeration hood at least partially submerged in the water to be treated."
Aeration inlet or ***aeration opening*** – Fig. 1, aeration holes 17.	***Aeration inlet*** or ***aeration opening*** – Figs. 1-3, water-passage parts 18.
Open region – Fig. 1, region between membrane modules 5 and aeration lines 18.	***Open region*** – Fig. 1, region between membrane elements 15 and air diffuser 6.
Aeration header – Fig. 1, aeration lines 18.	***Aeration header*** – Fig. 1, air diffuser 6.

30. Claims 27-29 are shown below in italics, with the claimed structure underlined that is keyed to the prior art in Table 3.

Claim 27. (currently amended): A water treatment system, comprising:

an aeration hood submerged in water to be treated, the aeration hood comprising an upper wall with an opening;

a tube distinct from any side wall of the aeration hood at least partially submerged in the water to be treated, the tube having a first open end sealingly secured to the upper wall (of the aeration hood) *at the opening; and*

a membrane module disposed within the tube, the tube extending part way along the length of the membrane module and defining an open region adjacent a lower end of the membrane module, the open region comprising a portion of the lower end of the membrane module extending from a lower end of the tube, the membrane module in fluid communication with the water to be treated through the (aeration hood's) *opening in the upper wall.*

Claim 28. (previously presented): The water treatment system of claim 27, further comprising an aeration header submerged below the aeration hood.

Claim 29. (previously presented): The water treatment system of claim 27, wherein the tube comprises at least one aeration inlet disposed at a tube wall thereof.

31. Regarding claims 27-29 – In Figs. 1-3 shown below, Horii discloses a "Sewage Treatment Apparatus Using [an] Immersion Type Membrane Separator." Horii, Title. Horii discloses the claimed invention except for explicitly describing some of the recited tube details. Cote et al. discloses some of the recited tube details in Figs. 9, 9A, and 9C shown below – in the

context of an "Installation for Making Water Potable with Submerged Filtering Membranes." Cote et al., Title. Ide discloses the remaining tube details in Fig. 5, shown below – in the context of a "Reverse Washing Apparatus of Hollow Yarn Membrane-Filter." Ide, Title.

Horii, Figs. 1-3:
Filtration arrangement with aeration hood to promote a circulatory flow.

Fig. 1

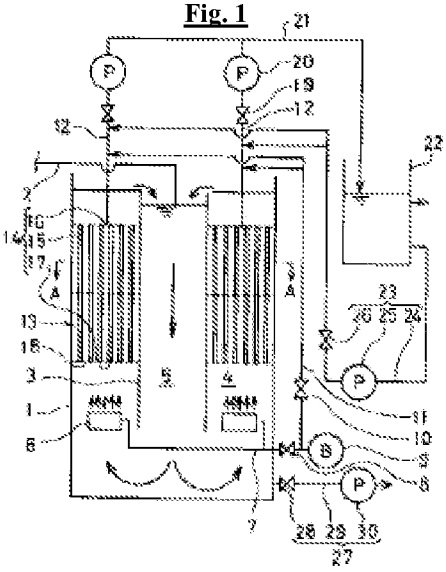


Fig. 2

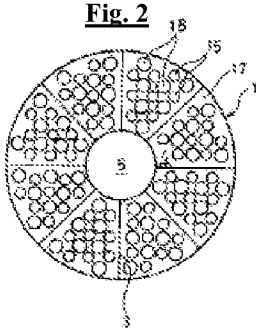
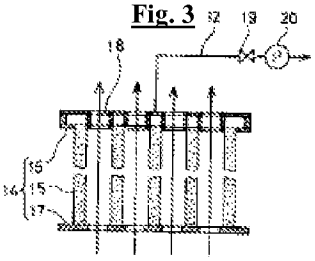


Fig. 3



Cote et al., Figs. 9, 9A, and 9C:
Membrane modules in tube to promote circulatory flow.

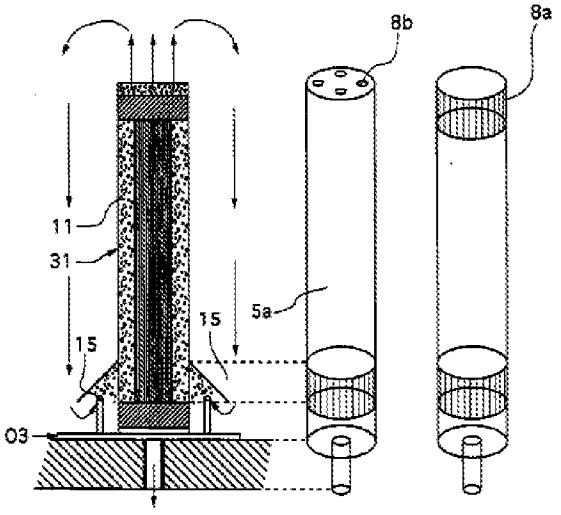
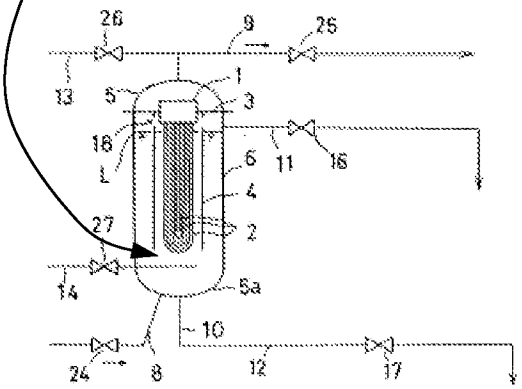


Fig. 9 Fig. 9A Fig. 9C

Ide, Fig. 5:
Membrane modules with open region between membranes and aeration header.



32. In the above figures, Horii discloses a water treatment system (Fig. 1) with an aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) that has an upper wall (Figs. 1 and 3, header 16 bottom) with an opening (Figs. 1 and 3, header 16 bottom periphery). Underneath the Horii aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) is an aeration header (Fig. 1, air diffuser 6) [claim 28].

33. In the above figures, Horii discloses a tube (Figs. 1 and 2, with partitioning walls 3) and further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various configurations such as cylindrical, fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As disclosed, then, Horii teaches applicant's Fig. 1 of upward flow through cylindrical channels (applicant's tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood within a feed tank) and meets the limitation of "a tube distinct from any side wall of the aeration hood at least partially submerged in the water to be treated." Horii further teaches the tube (Figs. 1 and 2, with partitioning walls 3) has a first open end sealingly secured to the upper wall (Figs. 1 and 3, header 16 bottom) of the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) at the opening (Figs. 1 and 3, header 16 bottom periphery).

34. In the above figures, Horii discloses that each tube (Figs. 1 and 2, with partitioning walls 3) has at least one membrane module within (Figs. 1 and 2, membrane elements 15 within partitioning walls 3). The tube (Figs. 1 and 2, with partitioning walls 3) extends the length of the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3) and defines

an open region (Fig. 1, region between membrane elements 15 and air diffuser 6) adjacent the lower end of the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3). The membrane module (Figs. 1-3, membrane elements 15 within partitioning walls 3) is in fluid communication with the water to be treated through the aeration hood's (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) opening (Figs. 1 and 3, header 16 bottom periphery) in the upper wall (Figs. 1 and 3, header 16 bottom) via water-passage parts 18.

35. In the above figures, Horii discloses that there is at least one aeration inlet (Figs. 1-3, water-passage part 18) but does not explicitly teach aeration inlets in the wall of the tube [claim 29]. Cote discloses these in Figs. 9, 9A, and 9C shown above – in the context of an "Installation for Making Water Potable with Submerged Filtering Membranes." Cote et al., Title. Specifically, Cote et al. discloses a membrane module mounted inside a tube (sheath 5a) having aeration inlets (open-worked zones 8a or holes 8b) in the wall of the tube (sheath 5a). Cote et al. further discloses that this arrangement is used to promote circulatory flow within the feed tank when Cote et al. teaches, "The ozone could thus be produced out of air (applicant's recited aeration generated by an aeration header) or oxygen. . . . [T]he ozone is thus used to serve both as a circulation fluid and an oxidizing fluid." Cote et al., col. 3, lines 10 and 27-28. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the Horii membrane modules within tubes as taught by Cote et al., since Cote et al. shows in Fig. 9 and states at col. 3, lines 10 and 27-28, such a modification would promote circulatory flow within the feed tank.

36. In the above figures, Horii discloses an open region (Fig. 1, region between membrane elements 15 and air diffuser 6) adjacent the lower end of the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3) and a tube (Figs. 1 and 2, with partitioning walls 3) extending the length of the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3). Horii does not explicitly teach “the tube extending part way along the length of the membrane module" such that "a portion of the lower end of the membrane module extend[s] from a lower end of the tube," as recited. In Fig. 5 shown above, Ide teaches that it is known in the art to extend a tube (protecting tube 4) partially along the length of the membrane module (membrane module 1 with membranes 2 that extend down to the bubbling air line 14) such that a portion of the lower end of the membrane module (membrane module 1 with membranes 2 that extends down to the bubbling air line 14) extends from the lower end of the tube (protecting tube 4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have extended the tube partially along the length of the membrane module such that a portion of the lower end of the membrane module extends from the lower end of the tube since this is an example of simple substitution of one known element (extend the tube along the length of the membrane module) for another (extend the tube partially along the length of the membrane module such that a portion of the lower end of the membrane module extends from the lower end of the tube) to obtain predictable results (the air enters the membrane module from its lower end, while the tube protects the membrane module along most of its length).

37. In summary, Horii, in view of Cote et al. and Ide for the tube design details, discloses or suggests all limitations recited in claims 27-29.

38. Dependent claims 30-34 are shown below in italics, with the claimed structure underlined that is keyed to the prior art in Table 3.

Claim 30. (previously presented): The water treatment system of claim 29, wherein the membrane module is in fluid communication with water to be treated within the aeration hood through the at least one aeration inlet.

Claim 31. (previously presented): The water treatment system of claim 29, wherein the aeration hood is partially filled with air.

Claim 32. (previously presented): The water treatment system of claim 29, wherein the membrane module is in fluid communication with air in the aeration hood through the at least one aeration inlet.

Claim 33. (previously presented): The water treatment system of claim 32, wherein the tube has a second open end in fluid communication with the water to be treated within the aeration hood.

Claim 34. (previously presented): The water treatment system of claim 33, wherein at least one aeration opening is disposed proximate the second open end (of the tube).

39. Dependent claim 31 was objected to above as failing to further limit claim 29. As such, claim 31 will be rejected on the merits as is claim 29.

40. Regarding dependent claims 30, 32, and 33 – In Fig. 1, Horii discloses a circulating flow pattern within the feed tank (Fig. 1, immersion tank 1) that has upward flow paths 4 and downward flow paths 5. As such, Horii discloses that the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3) is in fluid communication with the aeration

hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) through aeration inlets (Figs. 1-3, water-passage parts 18), [claims 30 and 32]. Horii further discloses that the tube's (Figs. 1 and 2, with partitioning walls 3) lower end is in fluid communication with the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) [claim 33].

41. Applicant recites that the "fluid communication" in claims 30, 32, and 33 has to be with "the air in" the aeration hood [claim 30] and with "the water to be treated within" the aeration hood [claims 32 and 33]. According to the MPEP 2115 [R-2], "'Expressions relating the apparatus to contents thereof (applicant's recited air and water) during an intended operation are of no significance in determining patentability of the apparatus claim.' *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, '[i]nclusion of material (applicant's recited air and water) or article worked upon by a structure being claimed does not impart patentability to the claims.' *In re Young*, 75 F.2d 996, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963))." As such, the claims were analyzed for patentability without regard to the air and water contents of the apparatus.

42. Regarding claim 34 – Horii discloses that at least one aeration opening (Figs. 1 and 2, water-passage parts 18) is disposed proximate the lower end of the tube (Figs. 1 and 2, with partitioning walls 3).

43. In summary, Horii, in view of Cote et al. and Ide for the tube design details, discloses or suggests all limitations recited in claims 27-34.

Claim Rejections - 35 USC § 103
Method of Cleaning a Membrane Module Recited in Claims 22-26 and 36

44. Claims 22-26 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horii (JP10076264A, Mar. 24, 1998 – esp@cenet Abstract, Patent Publication, Machine Translation), in view of Cote et al. (US 5,607,593, Mar. 4, 1997) and Ide (JP2277528, Nov. 14, 1990 – esp@cenet Abstract, Patent Publication, Translation) for the tube design details.

45. Table 4 below keys the claimed structure to that of the prior art. The claims follow in italics, with the keyed structure of Table 4 underlined. After each claim or set of claims is the patentability analysis in normal font.

Table 4: Claimed structure keyed to that of the prior art.

Claimed Structure	*Prior Art -- Horii*
Filtration arrangement – Fig. 1, arrangement.	***Filtration arrangement*** – Fig. 1, sewage treatment device using the immersed membrane separation device. Horii, ¶ 1, lines 1-2.
Feed tank – Fig. 1, feed tank 6.	***Feed tank*** – Fig. 1, immersion tank 1.
Aeration hood – Fig. 1, aeration hood 10.	***Aeration hood*** – Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall.
Membrane module – Fig. 1, membrane module 5.	***Membrane module*** – Figs. 1 and 2, membrane elements 15 within partitioning walls 3.
Tube – Fig. 1, tubes 14.	***Tube*** – Figs. 1 and 2, with partitioning walls 3. Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various configurations such as cylindrical (applicant's tube), fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As recited, then, Horii discloses applicant's Fig. 1 of upward flow through cylindrical channels (applicant's tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood in a feed tank) and meets the limitation of the "tube distinct from any side wall of the aeration hood extending downwardly from an upper wall of the aeration hood."
Aeration inlet – Fig. 1, aeration openings 17.	***Aeration inlet*** – Figs. 1-3, water-passage parts 18.

Claim 22. (currently amended): A method of cleaning a membrane module disposed in a tank comprising:

immersing in feed liquid a filtration arrangement comprising an aeration hood shrouding the membrane module, the aeration hood comprising an open-ended tube distinct from any side wall of the aeration hood extending downwardly from an upper wall of the aeration hood, the open-ended tube partially enclosing the membrane module, a portion of a lower end of the membrane module extending from a lower end of the open-ended tube, the open-ended tube comprising an aeration inlet in a wall of the open-ended tube at a location spaced from an upper end thereof;

lowering a liquid level in the aeration hood by displacing feed liquid within the aeration hood with a gas; and

passing the gas through the aeration inlet into a volume enclosed by the open-ended tube.

Claim 23. (previously presented): The method of cleaning the membrane module of claim 22, further comprising maintaining a liquid seal at a lower end of the tube.

Claim 24. (previously presented): The method of cleaning the membrane module of claim 23, further comprising maintaining a pressure drop across the aeration inlet sufficient to maintain the liquid seal.

Claim 25. (previously presented): The method of cleaning the membrane module of claim 22, further comprising withdrawing permeate through the membrane module.

Claim 26. (previously presented): The method of cleaning the membrane module of claim 22, wherein the act of passing gas through the aeration inlet comprises scouring the membrane module with gas passed through the aeration inlet.

Claim 36. (previously presented) The method of claim 22, wherein displacing the feed liquid within the aeration hood with a gas comprises displacing the feed liquid to a level below the location of the aeration inlet.

46. The claimed method recites use of the apparatus recited in claims 10-27 and 35. As such, the apparatus provided is disclosed by Horii, in view of Cote et al. and Ide.

47. Regarding claims 22, 25, and 26 – In Fig. 1, Horii discloses an "Immersion Type Membrane Separator" that is immersed in the feed liquid as recited [claim 22]. Horii, Title. In Fig. 1, Horii also teaches that permeate is withdrawn through the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3) [claim 25] with treated water pump 15, into treated water tub 22.

48. Regarding the aeration step limitations recited in claims 22 and 26 – In Fig. 1, Horii discloses that the membranes (Fig. 1, membrane elements 15) are aerated with blower 9 fed into diffusers 6 [claim 22]. During aeration, gas is passed through the aeration inlets (Figs. 1 and 2, water-passage parts 18) into a volume enclosed by the tube (Figs. 1 and 2, with partitioning walls 3), as recited [claim 22]. This act of passing gas through the aeration inlets (Figs. 1 and 2, water-passage parts 18) serves to scour or clean the membranes (Fig. 1, membrane elements 15) within the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3) with the gas (air) [claim 26]. Horii discloses this when, referring to Fig. 1, Horii teaches, "Inside the immersion tank (1), with the aerated air supplied from the diffuser (6) the upward flow of gas-

liquid mixed phase occurs inside the upward flow path (4)." Horii, Translation, ¶ 15, lines 1-4. Horii further teaches, "The upward flow path, wherein the flow paths among the mutual membrane elements (1) flow, becomes a traction, and by washing the membrane surfaces of the respective membrane elements (15), adhesion of solid to the membrane surfaces is suppressed." Horii, Translation, ¶ 17, lines 1-4. As such, Horii discloses all claim 26 limitations.

49. Regarding the claim 22 limitation

> *lowering a liquid level in the aeration hood by displacing feed liquid within the aeration hood with a gas;*

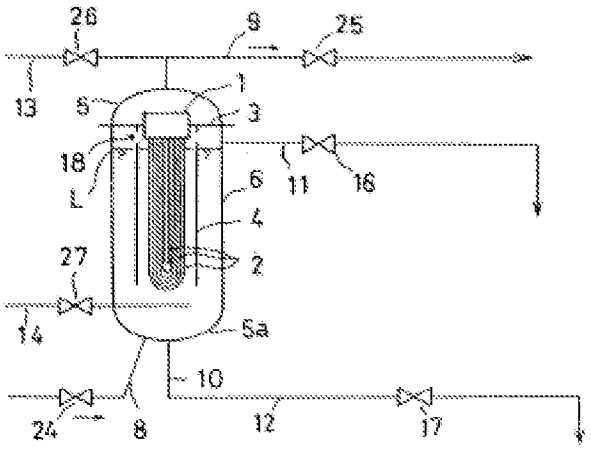
and claims 23, 24, and 36 shown below.

> *Claim 23. (previously presented): The method of cleaning the membrane module of claim 22, further comprising maintaining a liquid seal at a lower end of the tube.*
>
> *Claim 24. (previously presented): The method of cleaning the membrane module of claim 23, further comprising maintaining a pressure drop across the aeration inlet sufficient to maintain the liquid seal.*
>
> *Claim 36. (previously presented) The method of claim 22, wherein displacing the feed liquid within the aeration hood with a gas comprises displacing the feed liquid to a level below the location of the aeration inlet.*

Ide discloses the claim 22 method step in the context of a "Reverse Washing Apparatus of Hollow Yarn Membrane-Filter." Ide, Title. Specifically, in Fig. 5 shown below, Ide discloses the recited step is inherent when carried out in an enclosed aeration hood (tube plate 3 and trunk 6) with membranes (membranes 2) located in a tube (protecting tube 4) and the tube wall is

open-ended at the bottom and has aeration inlets (vent holes 18) above the membranes (membranes 2).

Ide: Fig. 5



50. Specifically, Ide refers to Fig. 5 and teaches, "[A] means for separating adhered fine particles by reverse washing with pressurized air and also removing the adhered fine particles by generating air at the side or bottom (applicant's configuration) of the hollow yarn membrane for vibrating the hollow yarn membranes is disclosed in the laid-open patent Sho 60[1985]-19002. . . . When reverse washing is carried out by these means, a phenomenon of ***gradually lowering the liquid level in the trunk during reverse washing occurs. By this, the upper part of the hollow yarn membrane is exposed to air*** so that the effect of vibrating the hollow yarn membranes by air is reduced by a half and a phenomenon of keeping separated fine particles in the protecting tube and adhering again the particles to the hollow yarn membrane also occurs." Ide, Translation, p. 4, lines 1-4 and 8-13, emphasis added.

51. Regarding claims 23, 24, and 36 – Horii, in view of Cote et al. and Ide, discloses or suggests the claimed invention. In the above paragraph, it was shown that Ide discloses that the recited step of

lowering a liquid level in the aeration hood by displacing feed liquid within the aeration hood with a gas;

is inherent when aeration is carried out in an enclosed aeration hood (tube plate 3, trunk 6, and tube 4) with membranes (membranes 2) located in a tube (tube 4) – where the tube wall is open-ended at the bottom and has aeration inlets (vent holes 18) at the top, above the membranes (membranes 2). During aeration, then, the liquid seal is maintained at the lower end of the tube [claim 23] with the aeration inlet openings there [claim 24] but the liquid level is also below the aeration inlet openings located at the upper end of the tube [claim 36]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have run the Horii method with the recited step of gradually lowering of the liquid level in the enclosed aeration hood due to gas displacement, as taught by Ide in the Translation, p. 4, lines 8-13, since Ide also states in the Translation, p. 4, lines 1-4 that the Horii method would remove the "adhered fine particles" from the membrane, i.e. would clean the membranes.

Response to Arguments

52. Applicant's arguments filed October 21, 2009 have been fully considered but they are not persuasive.

53. Applicant's arguments are listed below, with the examiner's response after each argument.

a. Regarding claims 10 and 20, applicant argues, "Horii discloses that the header 16 includes 'waterway section 18 for upflow to pass.' (Horii at paragraph [0013]; FIG. 2.) . . . One of ordinary skill in the art, upon reading that the header 16 should include

"waterway sections," (i.e. flow passages) would not have been motivated to modify the header of Horii in light of Cote or Ide so as to not contain flow passages." Applicant's Remarks, p. 8, lines 9-13. A similar argument was made regarding claim 22. Applicant's Remarks, p. 13, lines 9-13.

The limitation under discussion follows.

the aeration hood configured and arranged such that a gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood,

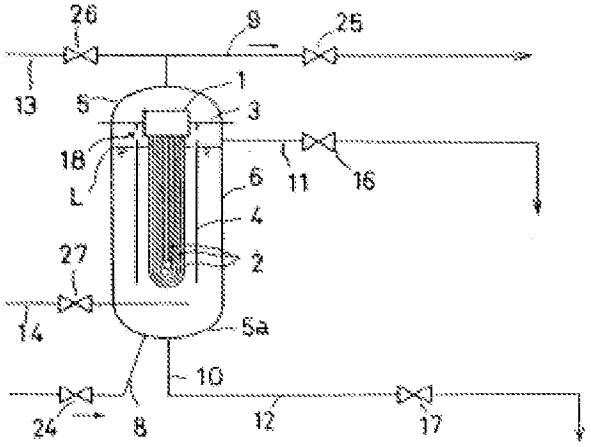
The examiner responds as in the above patentability analysis. Horii, in view of Cote et al., discloses or suggests the claimed invention except for explicitly teaching the aeration hood is enclosed, i.e. except for explicitly teaching

the aeration hood configured and arranged such that a gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood.

Ide teaches the enclosed hood meeting the recited functional limitation in the context of a "Reverse Washing Apparatus of Hollow Yarn Membrane-Filter." Ide, Title.

Specifically, In Fig. 5 shown below, Ide discloses limitation is inherent when carried out in an enclosed aeration hood (tube plate 3, trunk 6 and protecting tube 4) with membranes (membranes 2) located in a tube (protecting tube 4) and the tube wall is open-ended at the bottom and has aeration inlets (vent holes 18) at the top, above the membranes (membranes 2).

Ide: Fig. 5



Ide refers to Fig. 5 and teaches, "[A] means for separating adhered fine particles by reverse washing with pressurized air and also removing the adhered fine particles by generating air at the side or bottom (applicant's configuration) of the hollow yarn membrane for vibrating the hollow yarn membranes is disclosed in the laid-open patent Sho 60[1985]-19002. . . . When reverse washing is carried out by these means, a phenomenon of ***gradually lowering the liquid level in the trunk during reverse washing occurs***. ***By this, the upper part of the hollow yarn membrane is exposed to air*** so that the effect of vibrating the hollow yarn membranes by air is reduced by a half and a phenomenon of keeping separated fine particles in the protecting tube and adhering again the particles to the hollow yarn membrane also occurs." Ide, Translation, p. 4, lines 1-4 and 8-13, emphasis added. Also from the above, Ide provides the motivation to have configured and arranged the Horii filtration apparatus with an enclosed aeration hood, i.e. such that a gas fed into the aeration hood would ***gradually*** displace feed liquid and lower the level of feed liquid in the aeration hood, since Ide also states in the Translation, p. 4, lines 1-4, that such a filtration apparatus would allow "removing the adhered fine

particles by generating air at the side or bottom (applicant's aeration configuration) of the hollow yarn membrane," i.e., such a filtration apparatus configuration, with the enclosed aeration hood, would allow the membranes in the tube to be cleaned via aeration.

b. Regarding claims 10 and 20, applicant continues from the Point (a) argument, and argues that even "[i]f the header 16 of Horii were somehow modified so as to form an upper wall of an aeration hood as recited in either of independent claims 10 or 20, this would render the filtration apparatus of Horii inoperable for its intended purpose" because "[t]he device of Horii would then be incapable of circulating fluid from the 'upflow way 4' to the 'countercurrent way 5.'" Applicant's Remarks, p. 8, lines 19-21 and 25-26. A similar argument was made for claim 22. Applicant's Remarks, p. 13, lines 6-9.

The examiner responds that Horii discloses a single embodiment in Figs. 1-4 – with header 16's bottom wall being analogous to applicant's upper wall of the aeration hood. Regarding Fig. 1, Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various configurations such as cylindrical (applicant's tube), fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As such, Horii discloses many other embodiments, including applicant's claimed embodiment of upward flow through cylindrical channels (applicant's recited tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood in a feed tank).

In response to applicant's argument that the enclosed hood disclosed by Ide cannot be bodily incorporated into the Horii filtration apparatus, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

c. Regarding claim 27, applicant argues, "Horii does not disclose . . . open-ended tubes distinct from any side wall of an aeration hood." Applicant's Remarks, p. 11, lines 27-28. Applicant further argues, "Horii and Cote both fail to disclose an open-ended tube distinct from any side wall of an aeration hood." Applicant's Remarks, p. 12, lines 7-8. Regarding claim 22, applicant argues, "Horii, Cote, and Ide cannot disclose an 'aeration hood comprising an open-ended tube distinct from any side wall of the aeration hood.'" Applicant's Remarks, p. 13, lines 1-3.

Regarding independent claims 10, 20, 27, and 22, applicant further argues, "Ide does not disclose any open-ended tube or sleeve within the filtration arrangement" because "Ide does not disclose any open-ended tube or sleeve surrounding the membrane module and distinct from any sidewall of an aeration hood." Applicant's Remarks, lines 10-13.

The limitation under discussion follows.

Claim 10. . . . at least one open-ended tube distinct from any side wall of the aeration hood,

Claim 20. . . . an aeration hood positioned within the feed tank, distinct from the sleeve

Claim 27. . . . a tube distinct from any side wall of the aeration hood

Claim 22. . . . an open-ended tube distinct from any side wall of the aeration hood

The examiner responds as in the patentability analysis and Tables 1-4 above. Horii was cited for the limitation recited in all the independent claims. The claim 27 patentability analysis follows, as the example. Horii discloses the recited tubes, with partitioning walls 3, in Figs. 1 and 2. Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional configuration of representative flow paths may be of various configurations such as cylindrical (applicant's tube), fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As disclosed, then, Horii teaches applicant's Fig. 1 of upward flow through cylindrical channels (applicant's sleeves or tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood within a feed tank) and meets the limitation of "a tube distinct from any side wall of the aeration hood at least partially submerged in the water to be treated."

While Horii was cited for the limitation, Ide could also have been cited since, in Fig. 5, Ide discloses and open-ended tube or sleeve (protecting tube 4) surrounding the membranes (membranes 2) in a membrane module and the tube is distinct from any sidewall (trunk 6) of the aeration hood (tube plate 3, trunk 6, protecting tube 4). Ide further provides the motivation to construct the Horii filtration arrangement as such when Ide states in the Translation, at p. 4, lines 1-4 that such a filtration apparatus would allow

"removing the adhered fine particles by generating air at the side or bottom (applicant's aeration configuration) of the hollow yarn membrane," i.e., would allow membrane cleaning via aeration.

d. Regarding claims 10 and 22, applicant argues, "Sheaths 5, 5a of Cote do not comprise open-ended tubes extending downwardly from the upper wall of an aeration hood as recited in independent claims 10 and 22" because the figures in Cote "clearly show sheaths joined to the wall on the bottom end." Applicant's Remarks, p. 9, lines 5-9.

The limitation under discussion follows.

Claim 10. . . . the at least one open-ended tube extending downwardly from the upper wall (of the aeration hood)

Claim 22. . . . an open-ended tube . . . extending downwardly from an upper wall of the aeration hood

The examiner responds as in the above patentability analysis. Horii was cited for this. Specifically, in the above figures, Horii discloses a filtration arrangement (Fig. 1) with an aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) that has an upper wall (header 16 bottom) and a downwardly extending side wall (Figs. 1 and 2, partitioning walls 3 and portions of immersion tank 1's side wall), shrouding membrane modules (Figs. 1 and 2, membrane elements 15 within partitioning walls 3) that are vertically positioned within a feed tank (Figs. 1 and 2, immersion tank 1). Horii further teaches, "The upward flow path (4) and the downward flow path (5) may be arranged in reverse and the cross-sectional

configuration of representative flow paths may be of various configurations such as cylindrical, fan-shaped, rectangular, or the like." Horii, Translation, ¶ 11, 9-12. As recited, then, Horii discloses applicant's Fig. 1 of upward flow through cylindrical channels (applicant's tubes) and downward flow through rectangular or fan-shaped channels (applicant's rectangular hood within a feed tank) and meets the limitation of "at least one tube, distinct from any sidewall of the aeration hood, extending downwardly from the upper wall of the aeration hood."

e. Regarding independent claims 10, 20, 27, and 22, applicant argues that Horii, Cote et al., and Ide "are directed to fundamentally different and discreet filtration devices." Applicant's Remarks, p. 10, lines 4-5.

The examiner will interpret this to mean that Horii, Cote et al., and Ide are non-analogous art. In response to applicant's argument that the three references are nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, all three references are in the field of applicant's endeavor (membrane filtration in an immersed tank with aeration) and are reasonably pertinent to the particular problem with which applicant is concerned (placing hoods and tubes in the tank – to guide the water and air bubbles to more effectively clean the membranes).

f. Regarding claims 10, 20, 27, and 22, applicant argues, "The Examiner appears to have used hindsight reasoning." Applicant's Remarks, p. 10, lines 6-7.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

g. Regarding claim 20, applicant argues that none of the references meet the following limitation. Applicant's Remarks, p. 10, line 30 to p. 11, line 4.

at least one aeration opening in a wall of the aeration hood positioned adjacent to the open region, the aeration hood constructed and arranged to direct a gas through the at least one aeration opening and into an interior of the sleeve through the open region upon displacement of the feed liquid in the aeration hood;

The examiner responds as in the above patentability analysis. Horii discloses the limitation, as shown in Horii's Figs. 1-3 above. Horii teaches an open region (region between membrane elements 15 and air diffuser 6) adjacent the lower end of the membrane module (membrane elements 15 within partitioning walls 3) and shrouded by the aeration hood (header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall). The Horii open region (region between air diffuser 6 and membrane

elements 15) is further defined by the cross-sectional opening (applicant's recited aeration opening) in the sleeve or tube (with partitioning walls 3) just above the air diffuser 6. The sleeve or tube (with partitioning walls 3) is a part of the recited aeration hood (header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall). As such, Horii discloses the recited aeration hood (header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) arranged to direct gas through the aeration opening (cross-sectional opening in the tube, with partitioning walls 3, just above air diffuser 6) and into an interior of the sleeve or tube (with partitioning walls 3) through the open region (region between air diffuser 6 and membrane elements 15) when air diffuser 6 aerates, i.e. "upon displacement of the feed liquid in the aeration hood" with air, as recited.

h. Regarding claim 27, applicant argues that Horii does not disclose "open-ended tubes having open ends sealingly secured to an opening in an upper wall of the aeration hood" since "[i]t is the membranes 15 themselves which are secured to the header 16 of Horii, not any tube in which the membranes 15 are disposed." Applicant's Remarks, p. 11, lines 27-31.

The limitation under discussion is shown below.

Claim 27. (currently amended): A water treatment system, comprising:

an aeration hood submerged in water to be treated, the aeration hood comprising an upper wall with an opening;

a tube . . . having a first open end sealingly secured to the upper wall (of the aeration hood) *at the opening;*

The examiner responds as in the above patentability analysis. Horii discloses a water treatment system (Fig. 1) with an aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) that has an upper wall (Figs. 1 and 3, header 16 bottom) with an opening (Figs. 1 and 3, header 16 bottom periphery). Horii further teaches a tube (Figs. 1 and 2, with partitioning walls 3) with a first open end sealingly secured to the upper wall (Figs. 1 and 3, header 16 bottom) of the aeration hood (Figs. 1 and 2, header 16 bottom with partitioning walls 3 and portions of immersion tank 1's side wall) at the opening (Figs. 1 and 3, header 16 bottom periphery). As such, Horii discloses the limitation under discussion.

i. Regarding claim 27, applicant argues that none of the references meet the following limitation. Applicant's Remarks, p. 12, lines 7-11.

Claim 27. . . . the tube extending part way along the length of the membrane module and defining an open region adjacent a lower end of the membrane module, the open region comprising a portion of the lower end of the membrane module extending from a lower end of the tube,

Claim22. . . . the sleeve extending partially along a length of the at least one membrane module, and having an open region adjacent to a lower end of the at least one membrane module;

The examiner responds as in the above patentability analysis. Horii discloses an open region (Fig. 1, region between membrane elements 15 and air diffuser 6) adjacent the lower end of the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3) and a tube (Figs. 1 and 2, with partitioning walls 3) extending the length of the membrane module (Figs. 1 and 2, membrane elements 15 within partitioning walls 3). Horii does not explicitly teach “the tube extending part way along the length of the membrane module" such that "a portion of the lower end of the membrane module extend[s] from a lower end of the tube," as recited.

In Fig. 5, Ide teaches that it is known in the art to extend a tube (protecting tube 4) partially along the length of the membrane module (membrane module 1 with membranes 2 that extend down to the bubbling air line 14) such that a portion of the lower end of the membrane module (membrane module 1 with membranes 2 that extends down to the bubbling air line 14) extends from the lower end of the tube (protecting tube 4). For one of ordinary skill in the art, it would have been a simple substitution of one known element (extend the tube along the length of the membrane module) for another (extend the tube partially along the length of the membrane module such that a portion of the lower end of the membrane module extends from the lower end of the tube) to obtain predictable results (the air enters the membrane module from its lower end, while the tube protects the membrane module along most of its length).

Conclusion

54. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

55. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

56. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Denise R. Anderson whose telephone number is (571)270-3166. The examiner can normally be reached on Monday through Thursday, from 8:00 am to 6:00 pm.

57. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

58. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DRA/

/Walter D. Griffin/
Supervisory Patent Examiner, Art Unit 1797